SOCIO-ECONOMIC STUDY OF THE PROPOSED SHELL OIL COMPANY PEARL MINE

INTERIM REPORT VOLUME 8

Transportation

Submitted To:

THE MONTANA DEPARTMENT
OF
STATE LANDS

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This report is in the preliminary Review Draft stage. As such it represents neither the final judgement nor the official position of the Meadowlark Group or the State of Montana.

P.O.Box 1050
Helena, Montana 59601
406/442-9873

1110 South Third Avenue
Bozeman, Montana 59715
406/587-3560

"Travel is not purchased as an end product but rather to make other products and services available."[1/] A transportation system provides access between physically disassociated places. The economy, speed, safety, and pleasantness in which a transportation system services a community influences the physical form, economic development, and social and recreational patterns occurring within the community. A transportation system must be analyzed not only in terms of its modal diversity, carrying capacity, and physical condition, but also as to its impact on other socio-economic phenomena within a community.

A community's transportation system consists of all vehicles, travelways, and terminal facilities related to the circulation of people, goods, and services, whether publically or privately owned. In an idealic situation the various modes (cars, buses, trains, planes, etc.) will complement each other to the end that all individual transportation needs within a community are met. The level of sophistication to which a community's transportation system develops is primarily a function of the size and demographic characteristic of its population, its spacial density, its geographic location, and the characteristics of its economy. Generally, the greater the population, and density and diversity of activity in an area the more elaborate the transportation system.

By national standards the Sheridan-Decker Area is sparsely populated and its economy is nondiversified. For these reasons it has not been feasible for the area to support a large variety of modal alternatives. The community provides three major categories of transportation systems: Airways, railways, and roadway. These systems provide services which are in most instances mutually exclusive, although there is some overlap between long distance airway and roadway travel and railway and roadway (commercial trucking) services.

1/ Memmoth, F.W. and Guinn Chas. - Principals and Practices of Urban Planning - page 138

Roadway System

Roadway travel is the major method of personal travel within the impact area. The Sheridan-Decker Area is serviced by a variety of federal, state, city, county, and private roadways.

Freeways

Freeways are designed to handle high volumes of traffic, at high speeds, over long distances, and to accomodate a variety of roadway vehicles and fulfill a variety of trip purposes. Interstate 90 runs north-northwest through the western portion of Sheridan County. Nearly completed, the roadway connects the impact area with: Billings and the major cities of Montana to the north; with Casper, Cheyenne, and other Wyoming cities to the south and Denver; and with the cities along the eastern portion of I-90. The location of this roadway is a prime reason why tourism is a major industry in the Sheridan area, as it routes large volumes of traffic along the eastern boundry of the City of Sheridan. This is particularly true during the summer months.

Interstate 90 also handles a high volume of local traffic. Its north-south route and its proximity to Sheridan, the unincorporated urban areas to the south of the city Ranchester and Dayton, and the Big Horn and Decker area mines enables the roadway to handle high volumes of work and shopping oriented trips. In doing so, Interstate 90 reduces the travel time of local trips and alleviates some of the roadway congestion within the Sheridan urban area.

Arterials

An arterial's most important function is the movement of large volumes of motor vehicles from one part of an area to another. U. S. 87 follows a route similar to the route followed by I-90, in fact in areas where the interstate has not been completed I-90 traffic is routed onto the U. S. 87. This highway serves as a major arterial in Sheridan County. The roadway is especially significant to the present and future development of the impact area for several reasons: the roadway provides access to the city of Sheridan from Big Horn and the rural subdivisions in the southwestern portion of the county; the Coffeen Avenue section of the roadway is a developing commercial strip; the roadway to funnel large volumes of traffic directly into Sheridan's Central Business District; and the northern portion of the roadway is used by large numbers of Montana based construction workers traveling to the Decker Area.

U.S. 14 extends from southeastern Sheridan County to the City of Sheridan and from I-90 at Ranchester westward through the Big Horn Mountains in the direction of Yellowstone Park. The highway serves as the major east-west route in the county. The roadway also serves as the main street of Ranchester, Dayton, and Clearmont. In addition to handling large volumes of local traffic, during the summer months the roadway carrys many tourists traveling to Yellowstone Park. The roadway is also used frequently by hunters and fishermen to gain access into the Big Horn Mountains.

Within the city of Sheridan there are four major arterials. Main Street serves as the city's major north-south corridor and bisects the central business districts. Big Horn Avenue also runs north-south and extends from the southern edge of the city's Central Business Districts to the airport and southward. Fifth Avenue is the city's major east-west corridor and it bisects the city a few blocks north of the central business district. Coffeen Avenue (U.S. 87) brings vehicles from the rural areas south of the city directly onto Main Street.

Collectors

The purpose of collectors is to funnel traffic from local roads to arterials and freeways. With the exception of Fort Road which provides access to an industrial area and to a veteran's hospital, rural collectors in the Sheridan-Decker Area have traditionally been used to provide farm to market access. These roadways continue to serve this function; however, the Decker Road is now heavily used by workers traveling to and from the Decker Area mines, while the other rural collectors have experienced substantial changes in use due to the development of rural subdivisions.

Rural Collectors		
Decker Road	FAS-338 (WYO)	FAS-314 (MONT.)
West Fifth Street	FAS-330	
Wayarno Road	FAS-336	
Big Goose Road	FAS-331	
Big Horn Avenue & Road	to Girls School	FAS-332
Fort Road	FAS-337	

Several urban collectors within the city of Sheridan are urban extentions of rural collector routes. These collectors must funnel both internally and rurally generated traffic onto arterials and the freeway.

Principle Urban Collectors
Val Vista Avenue
West Loucks Street
Airport Road
Tenth Street
Sheridan Avenue
Danna Avenue
Highland Avenue
Gould Street

Local Roadways

The primary transportation purpose of local roadways to provide direct access to adjacent property. Sheridan County has approximately 1,200 miles of local roads.

* Interview Bill Laya County Commissioner Sheridan County - November
* Sheridan Area Planning Agency, Community Development Plan, Sheridan, Wyoming, 1977

Within the City of Sheridan there are 76 miles of roadway the vast majority consisting of local streets. Roadway mileage in Ranchester and Dayton is not known.

Private Roadways

The purpose of private roadways is to provide access from private property to the public roadway system. Many private roadways exist within the impact area. Typically, older private roadways were constructed to provide access to and within agricultural property. Recently, rural subdivision activity in Sheridan County has precipitated the construction of many new private roadways. Due to the financial limitations of the county, these roadways have not been accepted into the public road system. In the City of Sheridan, as in Ranchester and Dayton there are very few private roadways.

The System

The roadway network in the impact area is most elaborate in west-central portion of Sheridan county, with the City of Sheridan servicing as the system's nucleus. The roadways outside the city generally follow the routes of major drainages. Most rural roadways serve agricultural and rural residential areas - the most notable exceptions being the Fort and Decker Roads which service major employment nodes. The Big Horn National Forest restricts intensive road building in the extreme western portion of the county, although U.S. 14 does provide access to and through the Mountains. The sparsely settled agriculturally oriented uses existing in the central and eastern portion of Sheridan County and in the impact area of Big Horn County restrict the economic justifiability of an elaborate roadway system in these areas.

The Sheridan urban area has a rectangular shape with a north-south orientation. Traffic flowing into and from within the urban area is generally being routed in this manner; therefore, access to and the efficiency of north-south arterials is the key to effective management of the urban area's traffic.

The nucleus function of the city causes rurally generated traffic to be routed into the city. U.S. 87, Big Goose Road, Fort Road and numerous smaller roadways direct traffic onto city collectors and arterials. This phenomenon sometimes complicates the city's travel circulation because non-Sheridan destined traffic must travel through the urban system before reaching its destination.

Since the initiation of the West Decker Mine, roadway use in the impact area has changed slightly. Travel patterns are functions of the origins and destinations of vehicle trips. Locally generated traffic volumes are determined by population size, its demographic characteristics, and the nature of local economic activities. In Sheridan County there is a considerable amount of non-local "pass-through" traffic, which exists because of the presence of Interstate 90 and U. S. 14 and 87.

Some increases in traffic volumes on these federal highways can be attributed to increases in non-local travel. Increases in traffic volumes and changes in travel patterns on other roadways are primarily a function of local factors.

Sheridan County Road Supervisor, Charles Smith, observed that county traffic volumes have increased substantially since the opening of the West Decker Mine.1/ A similar statement was made by Clifford Sanders, city engineer for the City of Sheridan.2/ Both Smith and Sanders observed that these increases affected roadways throughout the western portion of the county and the city of Sheridan, rather than occurring as high volume increases concentrated on a few roadways. These observations were also concurred with by the Wyoming Highway Department Engineers: J. K. Johns and Tom Yates and are further substantiated by Highway Department statistics.

TABLE T-1: AVERAGE DAILY TRIPS
FOR SELECTED
SHERIDAN COUNTY WYOMING ROADWAYS
1969 - 1975

	1969	1970	1973	1975
I-90-25-South of Sheridan	1960	2830	2300	2790
I-90-25-East of Sheridan	1890	1580	1710	1800
I-90-25-North of Sheridan	2520	2260	3040	3000
U.S. 14-87-east of Ranchester	2460	2890	3050	3020
U.S. 14-87-south of Sheridan	1950	2080	2070	2140
U.S. 14-87-north of Big Horn	1140	1300	1190	1350
Coffeen Avenue - Sheridan	6683	7630	8420	9240
Main Street - Sheridan	----	----	8900	10,980
Big Goose Road- East of Beckton	680	810	810	830
Fort Road - Sheridan	1580	1670	1390	2400
Decker Road - Wyoming	----	460	400	500

Source: Wyoming Highway Department , Traffic Flow Maps 1969-1975

1977 traffic flows are not available at this time; however the Wyoming Highway Department maintains two permanent traffic counters in Sheridan County. These are located on U.S 87 at Parkman - just south of the Montana border, and U.S. 87 - Coffeen Avenue in Sheridan. Traffic flows in both areas have been increasing steadily

TRAFFIC COUNTS 1973-1977
SHERIDAN COUNTY, WYOMING

	1973	1974	1975	1976	1977	CHANGE
U.S. 87 Parkman	2701	2515	2786	3061	3538	31.0%
U.S. 87 Coffeen Avenue	9312	9753	10,172	11,944	12,256	31.6%

Source: Tom Yates, Sheridan Dist. Office, Wyoming Highway Department

1/ Source: Charles Smith, Road Superintendent, Sheridan County

2/ Interview with Clifford Sanders, City Engineer, Sheridan Wyo. October, 1977

Increases in the Parkman area can be explained by higher volumes of non-local traffic and frequent trips by Montana based workers traveling to the Decker area, while increases on Coffeen Avenue are attributable to population growth and changes in Sheridan County land use patterns.

The dispersal of increases in traffic volumes has probably had a mitigating effect. By dispersing traffic, the problem of over loading particular artierals and collectors has thus far been avoided. According to Clifford Sanders, only Main Street in the City of Sheridan is near capacity. The most recent traffic count of Main Street indicated the roadway ADT's to be 18,000 while Sanders estimated the Roadway capacity to be 21,000 ADT's. In discussing the future, Sanders cited traffic volumes on Big Horn, Highland, and Coffeen Avenues and Fifth Street as increasing steadily and having the potential of approaching capacity with continued growth.1/ It is significant that Main, Coffeen, Big Horn and Highland all route traffic in a north-south direction.

Traffic increases have apparently not caused any rural roadways to exceed their carrying capacities, although increased traffic congestion has slowed travel speeds on certain rural roadways.2/ A problem unique to rural roadways has arisen. This problem relates to conflicts between the movement of agricultural machinery on public roadways and the increasing use by non-agricultural vehicles.

Increased local traffic volumes and changes in travel patterns are to a large extent attributable to population growth in the area. This growth is not only significant in terms of actual numeric increases, but also because of the demographic characteristics of persons who have migrated into the area. Before new mining activity was initiated in the Decker area, Sheridan County's population had an usual demographic profile. Relative to State and National norms the county had an older population, its household sizes were small, its income levels low (a high proportion of low income families.). These factors are key variables in determining vehicle trip generate rates for households; (the two strongest determinants being household size and vehicles per household (which is closely correlated to household income3/)

1/ Interview with Clifford Sanders, City Engineer, Sheridan, Wyo. October, 1977

2/ Interview with Doyle Fritz, Land Quality Division, Wyoming Department of Environmental Quality

3/ Krueckenberg,D, and Donald Silvers, Urban Planning Analysis: Models and Methods Page 343

The demographic information implies that before the "coal boom" Sheridan County households had a lower than normal vehicle trip generation rate.

Recent immigrants into the area have tended to be younger, with larger families, higher incomes, and therefore have generated vehicle trips at a greater frequency than older residents. Vehicle licensing statistics bear out the anticipated increase in motor vehicle ownership. Note that while the county population between 1970 and 1976 was estimated to have increased by 16.5 percent 1/ vehicle licensing increased by more than double that rate - increasing by 38.8 percent.

TABLE T-3: VEHICLE REGISTRATIONS
SHERIDAN COUNTY, WYOMING
1970 - 1976

1970	1971	1972	1973	1974	1975	1976	CHANGE 1970-1976
15,588	16,794	18,148	18,148	19,749	20,853	21,651	38.8%

Source: County Treasurer's Office, Sheridan County Office

Another variable, household distance from the central business district is also an important determinant of household vehicle trip generation rates. Up to a certain distance, the number of vehicle trips per dwelling unit are inversely correlated with nearness to CBD. 2/ since much of recent residential development on the impact area has occurred on the periphery of the city of Sheridan and rural drainages near the city, these land use patterns can be anticipated to have caused increases in household vehicle trip generation rates.

While no roadway in the impact area is being utilized beyond its carrying capacity, there is increasing concern among Sheridan County residents regarding traffic control. The Sheridan County Needs Survey inquired as to whether residents felt traffic control was or could be expected to become a major problem for their community. In most communities traffic controls were cited as being an area of increasing concern. It is significant that the city of Sheridan which expressed the greatest concern regarding the control of traffic has also incurred the greatest numeric increases in traffic volumes, while Clearmont which is out of the impact area (over 50 miles from Decker)was least concerned regarding traffic control.

1/ County Treasures Office, Sheridan County, Wyoming
2/ Kruerkenberg and Silvers page 343-344

TABLE T-4: PERCENT OF COUNTY RESIDENTS CITING TRAFFICE CONTROLS AS AN AREA OF INCREASING CONCERN

	PERCENT	RANK
Sheridan (City)	80	4th
Clearmont	56	18th
Dayton	71	6th
Ranchester	71	14th
Story	73	6th
Big Horn	69	10th
Rural only	74	5th
County-wide	77	4th

Source: Sheridan Area Planning Agency, County Needs Survey 1976

Roadway Maintenance And Improvements

Within the city of Sheridan 52 of 76 miles of city streets are paved[1]. The City hopes to pave the remaining gravel streets through the establishment of special improvement districts.[2] The City's Community Development Plans reports that "streets are in good condition throughout the city." This analysis differs from resident responses to the County Needs Survey. In Ranchester and Dayton, city roadways are primarily gravel and are in need of maintenance. These communities would also like to pave these gravel streets through special improvement districts. In the unincorporated urban areas of Big Horn and Story roadways which are on the Federal Aid System are in good condition; however, other roads are gravel and could use additional maintenance. The problem is apparently more acute in Big Horn than in Story. In rural areas road quality varies depending on the availability of road funds. The Decker Road in Montana is maintained in poorer condition than its portion in Wyoming - ruts are a particular problem on this roadway.

TABLE T-5: PERCENT OF COUNTY RESIDENTS CITING ROAD MAINTENANCE AND IMPROVEMENT AS AN AREA OF INCREASING CONCERN

	PERCENT	RANK
Sheridan (City)	70	6
Clearmont	79	2
Dayton	79	3
Ranchester	77	6
Big Horn	80	2
Story	64	11
Rural only	76	6
County-wide	78	4

Source: Sheridan Area Planning Agency, Sheridan County Needs Survey, 1975.

In the City of Sheridan maintenance and improvement of local streets is the responsibility of the city. The general maintenance of local streets is normally paid for out of the city's general fund, while major improvements are financed by special assessments to benefiting property owners. Maintenance and improvements to collectors which are not on the Federal Aid System are financed through general revenue including some revenue generated by coal impact funds. The City of Sheridan requires paved streets as a condition for approval of subdivisions within the limits. Similar financing procedures are followed for the maintenance and improvement of streets in Ranchester and Dayton; however, much of the actual work is done by the county through an interlocal agreement.

1/ Sheridan Area Planning Agency, Community Development Plan - Sheridan, Wyoming, 1977

2/ Interview Clifford Sanders, City Engineer, Sheridan, Wyoming

In rural and unincorporated areas of Sheridan County, the county has responsibility for maintaining and improving local roads. The work is generally financed by general county revenues rather than through improvement districts. Due to its financial limitations the county has been reluctant to accept new subdivision roadways into its system. The county does require roadways in new subdivisions be developed to county standards; however, the maintenance of the roadways is left to adjoining property owners.[1]

Most collectors and the arterial roadways in Sheridan and the county are included in the Federal Aid System. The Wyoming Highway Department maintains Federal Aid System roadways outside the Sheridan Urban Area and has primary responsibility for the maintenance of Main Street in Sheridan. Other roads on the federal system in Sheridan are maintained by the city under a contractual agreement with the State. In Big Horn County, the Decker Road is maintained by the county under a contract with the State of Montana. The maintenance of this roadway presents the county with unique problems because of its isolation from the rest of the county.

The increasing maintenance requirements of Sheridan County roadways have caused local government road budgets to be increased substantially. Nearly every line item in the roadway budgets for the city of Sheridan and Sheridan County have been increasing annually. Much of the total monetary increases are being used to replace obsolete road machinery.

TABLE T-6: BUDGET FOR ROAD AND BRIDGE
SHERIDAN COUNTY

1975	204,139
1976	306,252
1977	327,295

"Transportation planning is the process by which transportation improvements or new facilities are systematically conceived, tested as to present and future adequacy, and programmed for future construction."[2/] The transportation elements or street and highway elements contained in the various comprehensive and community development plans prepared by the Sheridan Area Planning Agency do not fulfill this definition. The information contained in the plans does not demonstrate an in-depth understanding of the interrelationship of the transportation network to itself or to other plan elements. Basic data related to the transportation system, its performance, present and future travel characteristics, and its relationship to local land use characteristics and the local economy have not been adequately developed.

TABLE T-7: BUDGET FOR STREET AND ALLEY
SHERIDAN, WYOMING

1975	173,144
1976	143,429
1977	419,050

Source: City of Sheridan, Wyoming 1977-1978, Budget page 12

1/ Interview - Bill Laya, Sheridan County Commissioner

2/ Memonott, W. M. and Charles Guinn - Principals and Practices of Urban Planning, Transportation Planning, ICMA Washington D. C. 1968 page 137

While the transportation and street and highway elements contained in the comprehensive and community development plans are not "full blown" transportation plans they do have the potential of being extremely valuable. The respective plans establish goals, objectives, standards and policies. These are the most important components of a transportation plan because they establish guidelines and parameters. If decision makers utilize these plans to guide their future decisions many future transportion problems can be avoided.

The Community Development Plan for the City of Sheridan contains numerous recommendations for construction of immediate and long-range roadway projects. The county plan and the plans of the smaller urban areas do not contain definitive statements regarding future roadway projects. The Wyoming Highway Department appears to be playing a major role in prioritizing major roadway projects in these areas. Decisions regarding maintenance and improvement of county and local (off system) roadways are being made incrementally.

In the City of Sheridan, improvements to Coffeen, South Main, Gould and Brooks Streets, signaling projects, and the paving of the city's remaining gravel streets are identified by the Community Development Plan as immediate priorities. The road specific projects are designed to cope with the city's north-south traffic problems. Longer-range projects include bikeways and reconstruction in the vicinity of the airport, on Sheridan Avenue on Fifth Street, and on the northwest corner of the city.[1] Many of these projects have already been programed by the Wyoming Highway Department[2]

Non urban projects which have been programed by the Highway Department include: the completion of I-90 west of Ranchester; widening of U.S. 87 south of Sheridan; improvements to U.S. 14 east of Sheridan; reconstruction of Big Goose Road; the maintenance of bridges; and the improvements to railroad crossings. Sheridan County also intends to pave Lower Prairie Dog Creek Road north to the Montana border and is considering acquisition of right-of-way and construction of a road from Monarch to Ash Creek.

Other Roadway Transportation

The City of Sheridan receives daily bus service from a major commercial carrier.

1 / Sheridan Area Planning Agency, Community Development Plan Sheridan, Wyoming, 1977 page 113-114

2 / Interview with Tom Yates and J. R. Johns, Wyoming Highway Department

The bus route connects Sheridan with Hardin and Billings, Montana and with the major Wyoming cities south of Sheridan. In addition, a private vendor has just invented (started) a shuttle service designed to transport workers from Sheridan to the Decker Area. There is also one cab company providing service in the Sheridan Area.

There is no publicly operated bus system or other form of public transit operating in the impact area. The Sheridan County Needs Surveyinquired as to the willingness of local residents to pay for public transit. Support for mass transit was strongest in the cities of Ranchester and Dayton.1/ Overall 33 percent of county residents indicated they would be willing to pay for the service.2/

Summary

An impact of the initiation of mining in the Decker, Montana Area has been to cause increases in vehicular traffic and changes in travel patterns. The increase in traffic volumes has primarily been due to a numeric increase in population and changes in the demographic profile of area residents-larger households and greater automobile ownership. Changes in travel patterns are attributable to changes in land use patterns in the area - the location of a major new employer in the Decker Area and rural subdivision development.

Increases in traffic volumes have been dispersed throughout the impact area, which may have mitigated some of the overload potential of the recent increases. At the present time the roadway system is functioning adequately. Certain roadways, Coffeen, Highland, Big Horn, Main, Fifth, and Big Goose have experienced substantial increases in traffic volumes. If traffic volumes continue increasing on these roadways they will begin to approach their carrying capacities at which time travel speeds will decline and the frequency of accidents will increase.

Roadways on the rural or urban Federal Aid System have monies available to insure most necessary maintenance and improvements. City and County governments are having difficulties in financing the maintenance and improvement of roadways which do not receive federal aid. A special problem is the payment of special improvement district assessments by elderly and low income residents. The non-acceptance of roads in rural subdivisions is creating another problem, because these roads are being poorly maintained and many will eventually require rebuilding.

1 / & 2 / Sheridan Area Planning Survey, Sheridan County Needs Survey 1976.

The obsolesence of and the need for new roadway equipment is a problem shared by all communities in the impact area. Ranchester and Dayton, whose populations have doubled in the last five (5) years are experiencing much higher demands for road services, as is Big Horn which because it is unincorporated has no legal mechanism to deal with the problem directly. The same problem is occurring in the urbanizing areas in the Big and Little Goose Creek Drainages.

Changes in land use patterns, particularly the locations of the mine sites have caused a considerable increase in north-south traffic. During peak travel periods (7:00-8:00 A.M. and 4:30-6:00 P.M.) congestion occurs in the northern sector of the city of Sheridan where motoring traffic converges and evening traffic begins to disperse.

Rural residential development has caused increased usage of rural roadways and this shift in use has created some difficulty in the movement of agricultural machinery. Most of the rural roadways which are experiencing significant subdivision activities are linked to roadways within Sheridan. These roadways tend to funnel non-Sheridan destined traffic on to the Sheridan Urban System.

Commercial development on North Main and Coffeen have also changed traffic patterns. The discount store just opened on the extreme north end of the city will soon be a substantial traffic generator. The mixed commercial uses on Coffeen are generating increasing amounts of traffic. These volumes will continue to increase as the "strip development" fills in and Sheridan College experiences its anticipated growth. A particular concern regarding Coffeen is its curved route and the existence of non-perpendicular intersections. The roadway is likely to become very hazardous with increased traffic congestion.

An over riding concern regarding the roadway system in the Sheridan - Decker Area is the area's failure to develop a comprehensive transportation strategy. Land development is following roadway access. The pattern of roadway construction is and will continue to influence present and future land use patterns and government service requirements. The system design is being developed incrementally as reactions to problem situations, rather than being used as to tool to guide spatial patterns. The implications of system development are not being examined as they relate to overall community goals.

Impact

The Pearl Mine is small relative to many other mines which have been approved or are being proposed in the Sheridan - Decker Area. At peak output the mine will employ 134 workers. Direct and induced employments and employee household locations are key factors in determining what impact the mine will have on the area's roadway system. Assuming 95 percent of the mine's employees will reside in the impact area; each employee will reside in a seperate household, and the households will generate an average of nine vehicle trips a day (seven of which will be home based) 1/. The households of employees of the Pearl mine would generate an average of 1146 vehicle trips a day by 1980. In addition to trips generated by mine employee households, the households of derivative employees would generate another 1174 daily trips by 1980 and 1648 by 2000. The continuing increase of derivative household trip generation is a function of basic - nonbasic lag factor and the anticipated increase in the sophistication of the local economy.

TABLE T-8: TOTAL ESTIMATE VEHICLE TRIPS

	PEARL MINE EMPLOYEE HOUSEHOLDS	DERVIATIVE EMPLOYEE HOUSEHOLDS	TOTAL TRIPS
1980	1146	1176	2322
1985	1146	1311	2457
1990	1146	1437	2583
1995	1146	1554	2700
2000	1146	1626	2772

Source: Of base population data

1/ Seven home based vehicle trips per dwelling unit is the figure being used to predict vehicle trip generation by the Montana Highway Department

Where Pearl employees and derivative employees would locate their households would profoundly effect the travel patterns which they would generate. Existing roadway accessibility can be anticipated to influence the settlement options which would be available to persons working at the Pearl Mine. A gravity model can serve as good general indicator of how roadway access will influence settlement. The gravity model assumes that the attraction of an area is a function of its mass (population) and accessibility (roadway access) relative other places.

TABLE T-9: HOUSEHOLD LOCATION OF PEARL MINE EMPLOYEES IN 1980-1981

	EXISTING ROAD SYSTEM ONLY	WITH LOWER PRAIRIE DOG CREEK ROAD	WITH LOWER PRAIRIE DOG CREEK ROAD AND MONARCH - ASH CREEK
Sheridan	103	101	95
Ranchester	7	6	12
Dayton	3	3	5
Begtlom	2	2	2
Story	2	2	2
Big Goose Creek	4	4	3
South Sheridan - and Little Goose Creek	4	4	3
Prairie Dog Creek	0	3	3
Misc. Urban	3	2	2

In addition to predicting the Pearl employees household location patterns under the existing roadway system, the model has been used to test the effect of two additional county roads on settlement patterns. Under all three roadway alternatives the Sheridan Urban Area would experience the bulk of the settlements. The construction of Lower Prairie Dog Creek Road would have a very slight effect upon settlement patterns of Pearl employees, while construction of a Monarch to Ash Creek Road would have a greater effect, particularly in the Ranchester - Dayton Areas.1/

1/ A gravity model provides only a general guide to settlement patterns Other factors, the availability of housing, government services, aesthetics, etc. are also important determinants of settlement patterns in the Sheridan - Decker Area. It is believed that the model understates the attractiveness of Ranchester and Dayton.

The settlement patterns of mine employees would influence traffic patterns directly, through the location of trip origin through purchasing patterns of Pearl households, the settlement patterns of and trip generation patterns of derivative households would be determined. There would be strong relationship between derivative employment location and Pearl employee settlements, although it is anticipated that a slightly greater portion of derived households would locate in the Sheridan Urban Area.

The 2,322 daily vehicle trips which would be induced by the Pearl Mine would probably cause any roadway in the area's roadway network to exceed its carrying capacity. Pearl induced vehicle trips should cause a 3.7 percent increase in Sheridan County vehicle trips between 1975 and 1980, a 4.2 percent increase by 1990, and a 4.5 percent increase by 2000 1/ If these increases are dispersed throughout the impact area, as has happened in the instance of the existing Decker Mines, then the system should be able to accommodate the traffic. The major vehicle adverse effect of the Pearl induced trips would be the aggrevation congestion problems during peak travel periods (particularily related to the north-south movement of vehicles).

A factor which could adversely influence the capability of the Sheridan - Decker Road System to accommodate Pearl induced traffic increases, will be road maintenance. Pearl induced trips should contribute proportionately to road maintenance requirements. At the present time Sheridan County local governments are having difficulty in financing road maintenance and improvements. Impact monies designated for roadway, maintenance and improvements. The Pearl Mine would be generated by the Pearl Mine in Montana, however these moneys are not being made available to Wyoming Communities. Pearl induced traffic could have an adverse influence on roadway quality in Sheridan County. As the quality of a roadway decreases so does its carrying capacity. The Pearl Mine has the potential of reducing the quality of roadway maintenance; therefore, reducing the carrying capacity of area roadways. This phenomenon would further aggrevate existing congestion problems, possibly causing traffic flows on certain roadways to exceed their lowered capacities. The phenomenon has the greatest potential of occurring on heavily used roadways which are not on the Federal Aid System.

The Pearl Mine is one of many mines either already approved or being proposed in the Sheridan - Decker Area. Forecasted vehicle trip increases attributable to the Pearl Mine represent modest increases in traffic volumes. The problems which would arise as a result of these increases are primarily because the area's roadway system is already nearing its capacity, and each incremental increase in traffic, further

1/ Based on 1975 estimated ADTS for Sheridan County

aggravates the situation. In order to more clearly understand the environment which the Pearl Mine will be impacting as it relates to transportation, it is useful to examine the traffic generation and travel patterns which could be expected to occur as a result of other approved or proposed mines in the impact area.

TABLE T-10: SCENARIO I
AVERAGE DAILY VEHICLE TRIPS
SHERIDAN COUNTY, WYOMING

	LOW SCENARIO	% INCREASE FROM 1975	LOW SCENARIO WITH PEAK	% INCREASE FROM 1975
1975	62,233	- - - -	62,233	- - - -
1980	67,609	8.6	69,933	12.4
1985	72,192	16.0	74,647	19.9
1990	74,185	19.2	76,767	23.4
1995	76,165	22.4	78,862	26.7
2000	78,520	26.2	80,457	29.3

If only mines which are approved at the present time are initiated, traffic volumes within Sheridan County can be expected to increase by 8.6 percent between 1975 and 1980, 12.4 percent with approval of the Pearl Mine. As mining and derivative employment continues to grow traffic will increase by 19.2 percent by 1990 and 26.2 percent by 2000. With approval of the Pearl Mine, the increases will be 23.4 percent and 29.3 percent respectively. With the exception of the Public Service of Oklahoma's Ash Creek Mine, the mines in Scenario I are located in the Decker Area of Montana. A gravity model indicates that most workers in the Decker Area will locate their household in the Sheridan Urban Area, with most of the remainder located to the south and west of the city. The Ash Creek employees , because of the mine's location adjacent to the Pearl Mine will locate their households in a pattern very similar to the pattern anticipated for Pearl employees, with the majorities settling in Sheridan with a higher settlement rate in Ranchester and Dayton.

The increases in traffic volumes predicted by Scenario I will complicate an already difficult situation for cities and the county. An 8.6 percent increase in traffic, if uniformly applied, would not quite push Main Street beyond its carrying capacity - nor would the increment added by the Pearl Mine. However, the increases would probably lower individual travel speeds and increase accident frequency on the roadway. Congestion and accident levels on Fifth Street and Highland Avenues must also be anticipated to increase. Coffeen Avenue has a particularly serious accident potential because of the high levels of traffic it will be carrying, its developing commercial strip, and the roadway's design limitations.

Rural roadways, particularly in the Big Goose Creek, Little Goose Creek, and Big Horn areas can be expected to continue to experience greater congestion. This will reduce roadway efficiency and increase the frequency of conflicts between agricultural and non-agricultural vehicles. The funneling of the rural traffic into Sheridan will increase problems for Sheridan Urban collectors and arterials.

The need for maintenance will increase proportionately, as traffic volumes become greater. Locally generated tax revenues will lose ground relative to the monies necessary to provide adequate road maintenance. The major mines in Scenario I are located in Montana, causing impact money for roadway maintenance to be inadequate. Roadway maintenance for rural residents will become an increasingly serious problem as more use is made of roadways which have not been accepted for maintenance by the county.

A parking study indicated an existing parking shortage in Sheridan's Central Business District area.[1] Additional competition for a finite number of parking spaces in the central business district will discourage the central business district shopping areas.

TABLE T-11: SCENARIO II
AVERAGE DAILY VEHICLE TRIPS
SHERIDAN COUNTY, WYOMING

	MOST PROBABLE SCENARIO	% INCREASE SINCE 1975 WITH PEARL	MOST PROBABLE SCENARIO WITH PEARL	% INCREASE SINCE 1975
1975	62,233	- - - -	62,233	- - - -
1980	68,069	9.3	70,420	13.2
1985	81,236	30.5	83,691	34.5
1990	83,762	34.6	86,344	38.8
1995	86,273	38.6	88,970	43.0
2000	88,262	41.8	91,033	46.3

All the mines included in Scenario II are located in Montana and all Mines are provided access into Sheridan County by Decker Road. Mine employees in Scenario II should follow household settlement patterns similar to those followed by the Decker Area employees in Scenario I.

1/ Wyoming Highway Department, Sheridan Traffic Operations Study February 1977, page 4

If Lower Prairie Dog Creek is constructed it will attract households from these mines.

Scenario II would have a similar effect to Scenario I into the early 1980's, however during the middle of the decade employment would increase substantially, causing a corresponding increase in vehicle trips. In 1985, there would be a 30.5 percent increase in vehicle travel in Sheridan County - with the Pearl Mine a 34.5 percent increase. Assuming present travel patterns and roadway conditions, a 30 percent to 35 percent increase would probably overload many roadways in the system. In particular, Main Street and Fifth Street would not meet traffic demands. Other roadways, Highland Avenue, Danna Avenue, Sheridan Avenue, and Big Horn (all north-south) would probably become heavily congested. As identified arterials and collectors approached capacity local urban streets would be used increasingly by through traffic. This would have a disruptive effect on residential neighborhoods.

Existing rural collectors, county local roadways, and private rural roadways would be expected to handle significantly higher levels of traffic. Many previously local roads would function as collectors because sprawl type residential development would attempt to channelize traffic onto county maintained roadways. In some roadways, e.g. in the Big and Little Goose Creek Areas, the Big Horn Area, and possibly the Prairie Dog Creek Area, conflict between agricultural and non-agricultural vehicles might actually be reduced. This might occur because increased traffic speeds and volumes might make it impossible for agricultural vehicles to travel on the roadways and because to a considerable extent agricultural activities in these areas might be displaced by residential land uses.

In Scenario II parking in the central business district would become a severe problem by 1985. A decision may be made to eliminate on-street parking on Main Street in order to increase its carrying capacity. The central business district parking situation will put "downtown merchants at a disadvantage when competing with spacious shopping areas."

In the small urban communities, Scenario II will cause more urban--type travel patterns to develop. Ranchester could be expected to undergo significant changes. Its development of more substantial commercial district would serve to slow east-west traffic on U.S. 14. Increasing amounts of internally generated traffic would cause the development of defacto collector streets through residential areas and cause many residential land uses to be replaced by commercial activities. Commercial development might also be expected to follow U.S. 14 westward in the direction of Dayton. This development would also serve to slow traffic on the highway.

In addition to proportional related increases in maintenance problems. as are cited in Scenario I, the large increase in traffic volumes forcasted by Scenario II would necessitate major capital improvements to the roadway system. In addition to expenditures for engineering, materials, and construction, the cities and county would need to acquire additional right-of-way along many existing roadways and along new roadways. Land prices in the impact area will be inflated, and will add considerably to the ultimate cost of roadway projects.

TABLE T-12: SCENARIO III
AVERAGE DAILY VEHICLE TRIPS
SHERIDAN COUNTY, WYOMING

	SCENARIO III	% INCREASE from 1975	SCENARIO III WITH PEARL	% INCREASE from 1975
1975	62,223	- - - -	62,223	- - - -
1980	70,036	12.5	72,360	16.3
1985	89,541	43.9	91,996	47.8
1990	100,890	62.1	103,472	66.2
1995	104,303	67.6	107,001	72.0
2000	107,119	72.2	109,833	76.6

Scenario III would generate extreme increases in traffic volumes in the impact area. The mines and power plant included in this scenario are with the exception of the Youngs Creek Mine located in the Northern part of Sheridan County. Sites for the power plant and the Whitney Mine are located near the Decker Road and Lower Prairie Dog Creek Road. Most workers from the plant and mine will follow the patterns established by Decker Area workers; although Lower Prairie Dog Creek should attract a larger share of their households. The Youngs Creek and Welch Mines would have their greatest impact on the Sheridan and Ranchester Dayton Area, particularly if a Monarch to Ash Creek Road is constructed.

Scenario III would cause a 12.5 percent increase in traffic volumes by 1980 - 16.3 percent increase with the inclusion of the Pearl Mine. In the early 1980's the employment would be increased exponentially and this would cause a tremendous increase in traffic generation in the area. By 1985 traffic volumes could be expected to be 45 percent to 48 percent greater than in 1975. All major urban arterials and collectors would be operating at or in excess of their carrying capacity. By 1990 traffic volumes would have increased by 60 percent and by over 70 percent by 2000.

Traffic flow increases as are projected in Scenario III would radically alter the use of urban and rural roadways system. Subject to existing financial limitations the local governments could not maintain or improve roadways adequately. Under Scenario III roadway travel could be anticipated to deteriorate to a very low quality of service.